

circuits, or an interesting new topology **20**, the Stanley topology [9] shown in **Figure 8** can be used. The whole circuitry is placed inside a dewar exhibiting good thermal insulation walls, preferably using multi-layer vacuum insulation (MLI).

The motor drive circuitry if implemented in the topology of **Figure 8** consists of transistors, preferably MOSFETs, **21-24**, controlled by drive circuits **25-28** and operated with pulse-width modulation (PWM). Commutating diodes **29-32** may be implemented with cryo-silicon or cryo-germanium devices. The latter have a much lower on-state voltage. Inductors **34-38** could be implemented with high-temperature superconductors. Together with capacitors **39** and **40** they form a filter for the elimination of the pulse-width modulation frequency. Inductor **36** constitutes the windings of the motors. The MOSFETs **21-24** and diodes **29-32** can be implemented in the form of cryo-multi-chip modules providing miniaturization. This motor drive circuitry can have an electronic efficiency (without cooling penalty) of greater than 99.7%.

It has been found that some gallium-arsenide based light-emitting diodes (LEDs) can exhibit 1-2 orders of magnitudes higher light output if cryo-cooled. Thus, cryo-cooled LEDs can be used in the Cryo-Bus of this invention for indoor and outside lighting applications.